

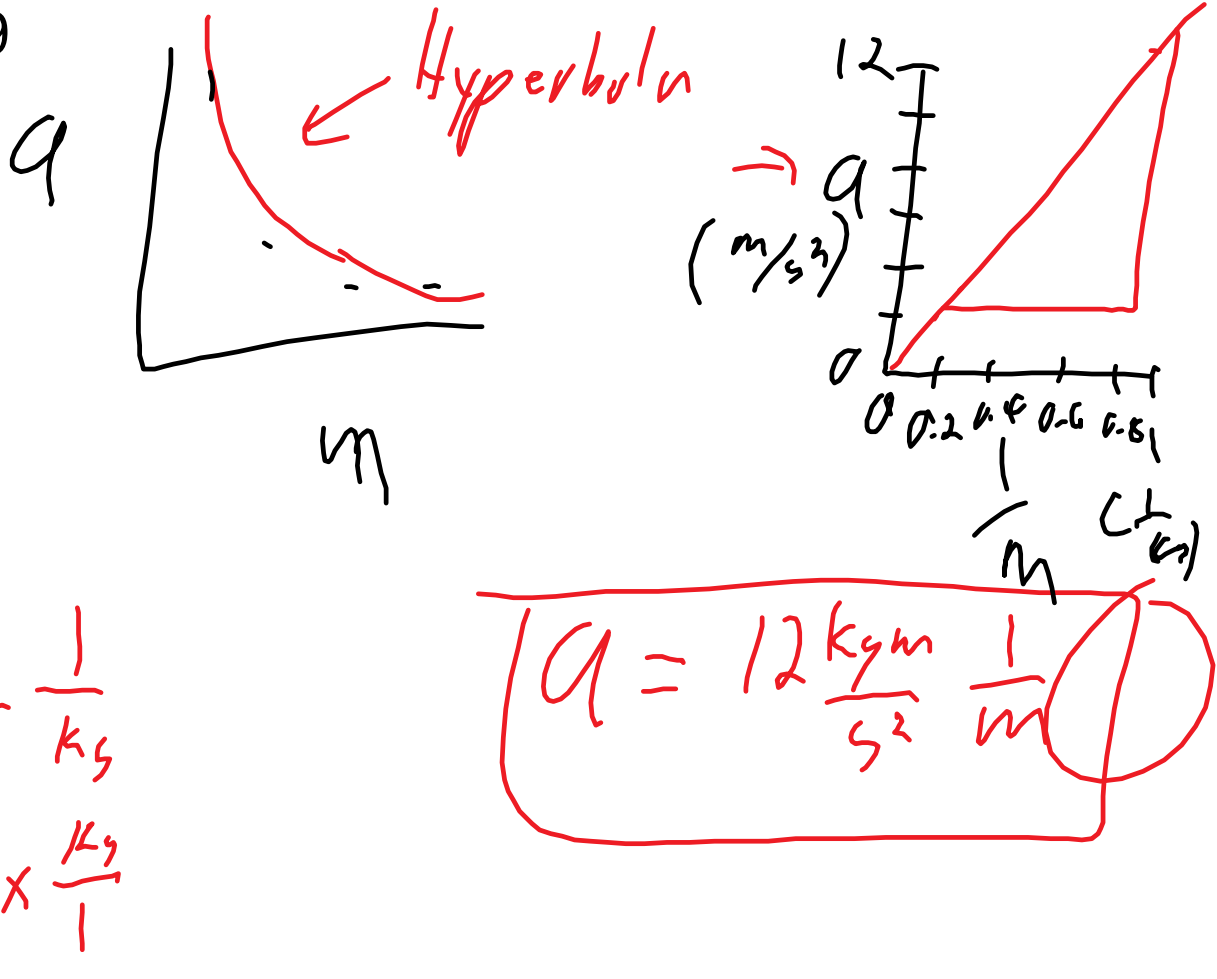
Hand in Lab

Homework - units, sig figs, graphing

Quiz next class

Review position, displacement, velocity, speed.

p38 Q19



Displacement and Velocity (chapter 3)

Position, distance and displacement.

distance - how far apart two points are. No direction included, just the space.

symbol in the textbook is d , units: metres, m

position and displacement can be negative to indicate that they include direction.

position is where the point is relative to a reference point. eg. you are 0.50 m in front of the sensor, or -0.50m you are behind the sensor.

symbol is x or y or z for position, units: metres

displacement is change in position from your starting point to the end point.

symbol is d (same as distance in book) units metre, m

eg. you start 1.0 km East of the school and walk 3.0 km West. What is your

a) distance travelled? 3.0 km

b) displacement? 3.0km West

c) final position? 2.0 km West of the school
reference point

Velocity and speed

Velocity is speed with direction.

Speed is the distance travelled per unit time.

Velocity is the rate of change in position.

$$V = \Delta x / \Delta t$$

if the velocity is constant, $v = d/t$

velocity is also the slope of the position or

displacement - time graph

$v=0$ graph is flat

$v=\text{positive}$ the graph goes up

$v=\text{negative}$ the graph goes down.

eg. You run six laps around the track in 13 minutes. Each lap is 400m. The starting point is 200m North of the school. What is

- a) distance run
- b) displacement
- c) initial position at the start of the run
- d) average speed
- e) average velocity
- f) your instantaneous velocity when you are running East (velocity at one point in time)

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Q1-8, Concept Review 1.1-1.4 - be ready after the quiz to go over them

eg. You run six laps around the track in 13 minutes. Each lap is 400m. The starting point is 200m North of the school. What is

- a) distance run
 $6 \times 400 = 2,400 \text{ m}$

- a) displacement
zero (you end at the same point you started)

- a) initial position at the start of the run

200m North of the school

b) average speed

$$v_{\text{avg}} = d/t = 2400/(13 \times 60) = 3.0769$$

3.1 m/s

c) average velocity

zero (displacement is zero)

a) your instantaneous velocity when you are running East (velocity at one point in time)
assuming a constant speed, the velocity will be 3.1 m/s East at that instant.

Quiz next class

Hand in Lab

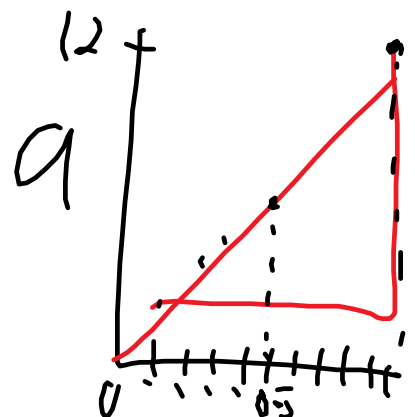
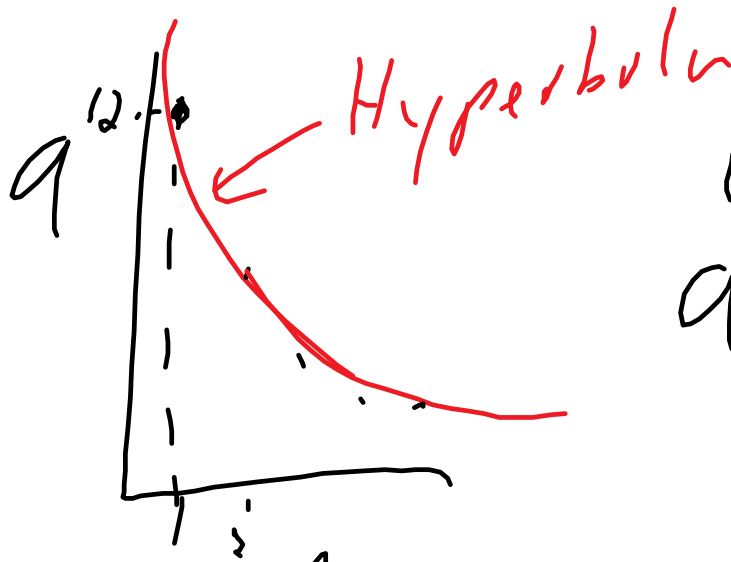
Homework - units, sig figs, graphing

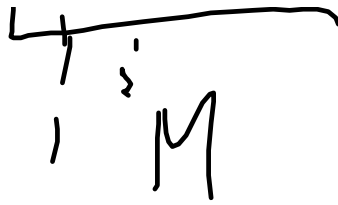
Quiz next class

Review position, displacement, velocity, speed.

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Q 19





$$\text{Slope} = \frac{12 \text{ m/s}^2}{1.0 \frac{1}{\text{kg}}}$$

$$12 \frac{\text{m}}{\text{s}^2} \div \frac{1}{\text{kg}}$$

$$12 \frac{\text{m}}{\text{s}^2} \text{ kg}$$

$$a = 12 \frac{\text{kg} \cdot \text{m}}{\text{s}^2} \frac{1}{\text{kg}}$$



→



→



Position, displacement, distance, velocity, speed
(chapter 3)

Position - Where are you? Relative to a reference point, include direction.

Can be negative if you are behind the reference point.

symbol: x or y or z units: metres, m

displacement - your change in position, include the direction.

symbol: d units: metre, m

distance: How far apart are two points. Don't include direction.

symbol: d units: metre, m

eg. You start 1.0 km East of the school and walk 3.0 km West. What is your

a) distance travelled: 3.0 km

b) displacement: you walk 3.0 km West

c) final position: 2.0 km West of the school
reference point

speed: the rate the object moves, how fast it moves,
the average speed = distance travelled / time

$$V_{\text{avg}} = d/t$$

instantaneous speed - speed at one instant

if the speed doesn't change - constant speed, then
 $v = d/t$

velocity, v is speed with direction, (vector - means you include direction)

velocity is the rate of change in position

$$v = \Delta x / \Delta t$$

slope of the position - time graph

If you are not moving, you get a flat graph

if you are moving in the positive direction, you have a positive slope

if you are moving in the negative direction, you have a negative slope - negative velocity

curvy x-t graph shows a changing velocity

eg. You are running 6 laps of a 400.0 m track in 11.0 minutes. If you start on the starting mark 100.0 m north of the school, determine

a) distance run

$$6 \times 400 = 2,400 = 2.400 \times 10^3 \text{ m or } 2.400 \text{ km}$$

a) displacement

you end up at the same point, so displacement = 0

a) final position

100m North of the school

a) average speed

$$v = d/t = 2400 \text{ m} / (11 \text{ min} \times 60 \text{ s/min})$$

$$2400 / (11 \times 60) = 3.6364$$

$$3.6 \text{ m/s}$$

a) average velocity

zero, displacement is zero

a) instantaneous velocity when you are running East.

3.6m/s East assumption: speed is constant as the direction changes

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Concept Review 1.1-1.4

units: m/s

Quiz next class

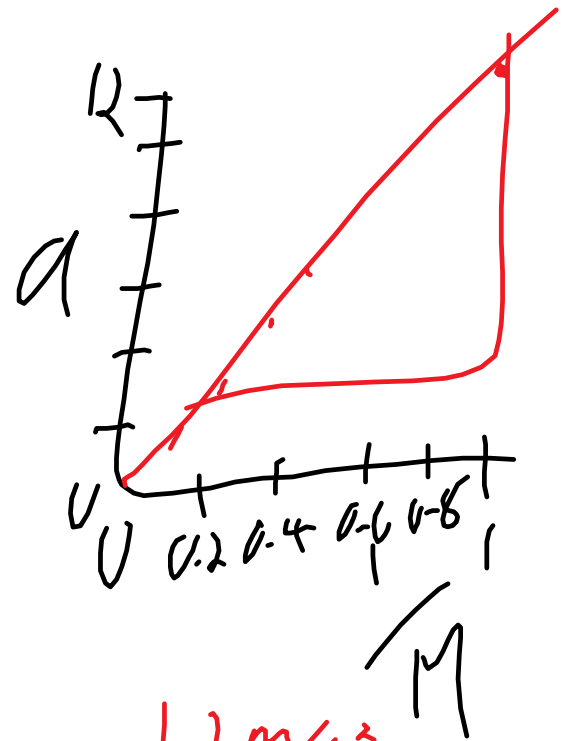
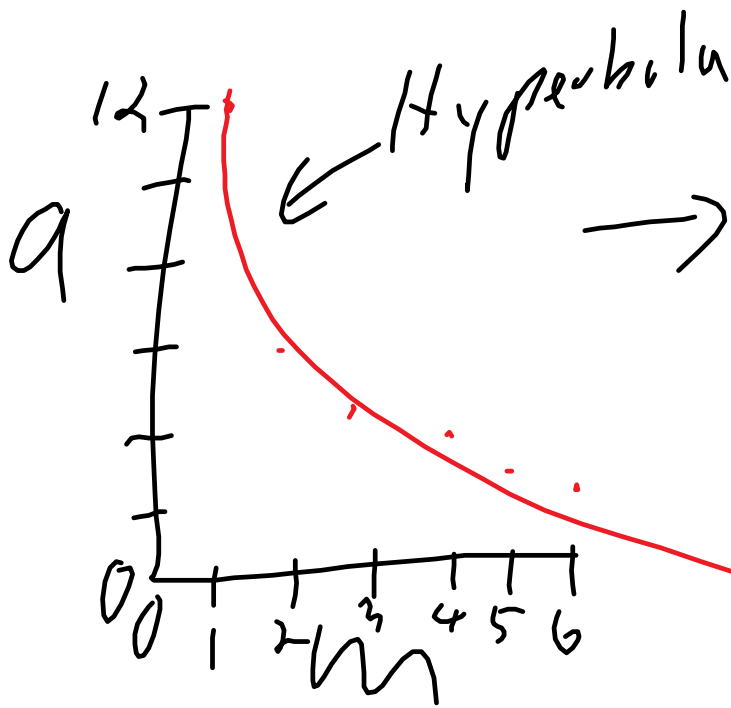
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Homework - units, sig figs, graphing

Quiz next class

Review position, displacement, velocity, speed.

p39 Q19



$$\frac{v_{ise}}{v_m} = \frac{12 \text{ m/s}^2}{1/\text{kg}}$$

$$\text{Slope} = 12 \frac{\text{m}}{\text{s}^2} \div \frac{1}{\text{kg}} = 12 \text{ kg m/s}^2$$

$$y = mx + b$$

$$a = 12 \text{ kg m/s}^2 \frac{1}{M} + 0$$

$$h \rightarrow G$$

Distance, Displacement, Position, Speed Velocity (Chapter 3)

Distance: from A to B - the length between the points.

symbol: d units: metres, m

Position: How far you are from the origin or reference point in a direction.

symbol: x or y or z units: metres and degrees.

Displacement: change in position, with direction.

symbol: d units: metres

eg. You walk 150m North, then 50 m South. If you started 50 m North of the class, determine

a) distance travelled $150+50=200$ m total

b) displacement $150-50=100$ m North

set North as positive

c) final position relative to the class

$50+100=150$ m North of the class

reference point

Speed and Velocity

speed is how fast you are going. rate of moving through space

average speed is your total distance/ total time

$$v_{\text{avg}} = d/t$$

velocity - speed with direction

Rate of change in position with respect to time.

$$v = \Delta x / \Delta t$$

slope of your position-time or displacement - time graphs

$$v_{\text{avg}} = d/t \text{ total displacement / total time}$$

instantaneous velocity - your velocity at one instant

eg. you run 6 laps of a 400.0 m track in 9 minutes and 40 seconds. If the starting mark is 100.0 m North of the school and you end at the same point, determine:

a) distance run

$$6 \times 400 = 2,400 \text{ m } 2.400 \text{ km or } 2.400 \times 10^3 \text{ m}$$

a) displacement

zero - you end where you start

b) final position

100.0m North of the school

a) average speed

$$2400 / ((9 \times 60) + 40) = 4.1379 = 4.1 \text{ m/s}$$

a) average velocity

zero (displacement was zero)

a) instantaneous velocity when running East

assume your speed is constant, then velocity
=4.1m/s East

p45-49 all questions

(Q1-8, ConceptReview1.1-1.4)